

**REMARKS**

In the present Amendment, new claim 10 has been added. Claim 10 is supported by the specification, for example, original claim 4 and page 41, lines 12-17. Claims 5-9 were previously canceled. No new matter has been added.

Upon entry of the Amendment, claims 1-4 and 10 will be all of the claims pending in the present application.

**I. Response to Rejection under 35 U.S.C. § 103(a)**

Claims 1-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2003/0171481 to Toyoda et al. Applicants respectfully traverse the rejection for the reasons of record and the following additional reasons.

Independent claim 1 recites a polyethylene wax defined by the following features (i) to (vi): (i) said polyethylene wax is an ethylene homopolymer or a copolymer of ethylene and at least one olefin selected from  $\alpha$ -olefins of 3 to 20 carbon atoms, (ii) a ratio (Mw/Mn) of the weight-average molecular weight (Mw) to the number-average molecular weight (Mn), as measured by gel permeation chromatography (GPC), is in the range of 1.7 to 4.0, (iii) the softening point is not higher than 105°C, (iv) the penetration hardness is not more than 10 dmm, (v) a ratio (Mz/Mw) of a z-average molecular weight (Mz) to a weight-average molecular weight (Mw), as measured by gel permeation chromatography (GPC), of 1.5 to 2.0, and (vi) a density of 880 to 910 kg/m<sup>3</sup>.

Toyoda describes a polyethylene wax which is a solid at room temperature and becomes a low-viscosity liquid at or above a temperature of from 80 to 120°C (paragraph [0044]). However, this disclosure means that a softening point of the polyethylene wax of Toyoda is not the range of from 80 to 120°C, but at or above the range. That is to say, this disclosure means that the ethylene wax of Toyoda may have a softening point of 120°C or more, in addition to the

range of from 80 to 120°C. In fact, Applicants demonstrated in the Declaration filed on August 14, 2009, that waxes a1 and a3 of Toyoda have a softening point of 109°C and 135°C, respectively. Therefore, Toyoda very broadly discloses a softening point of the polyethylene wax including beyond the range of the softening point (iii) recited in present claim 1.

In addition, Toyoda describes that the density of the ethylene (co)polymer is in the range of from 850 to 980 kg/m<sup>3</sup>, preferably from 890 to 970 kg/m<sup>3</sup>, and more preferably 900 to 950 kg/m<sup>3</sup> (paragraph [0041]). That is to say, Toyoda very broadly discloses the density of the ethylene (co)polymer including beyond the range of the density (vi) recited in present claim 1, i.e., 880 to 910 kg/m<sup>3</sup>. In fact, Applicants demonstrated in the above mentioned Declaration that waxes a1 and a3 of Toyoda have a density of 920 kg/m<sup>3</sup> and 977 kg/m<sup>3</sup>, respectively.

Further, Applicants demonstrated in the above mentioned Declaration that the polyethylene waxes a1 and a3 of Toyoda did not fulfill the softening point (iii) and the density (vi) recited in present claim 1, and thereby the shrinkage ratio became very high.

As described above, disclosures of Toyoda are very broad. The Office Action has failed to provide any reason for choosing specific values from the broad ranges of softening point and density described in Toyoda, both of which satisfying the recitations of present claim 1. Moreover, the Office Action has not shown that the polyethylene waxes disclosed in Toyoda fulfill all the properties recited in present claim 1.

In addition, Toyoda does not disclose that the properties, such as softening point, density and penetration hardness, vary with the constitution of ethylene (co)polymer.

On the other hand, Examples 1 and 2 of the present specification use ethylene/1-butene copolymer and Examples 3 and 4 use ethylene/4-methyl-1-pentene copolymer. As is clear from the results of these Examples (Table 1), even if the distribution of molecular weight and the density are comparable, the balance between the softening point and the penetration hardness varies with the type of  $\alpha$ -olefin of 3 to 20 carbon atoms and thereby the shrinkage ratio also

varies. That is to say, it is very important to fulfill all features (i) to (vi) as defined in present claim 1, in order to achieve low shrinkage ratio (page 8, line 3 to page 12, line 3 of the present specification).

As noted above, Toyoda very broadly discloses certain properties of ethylene wax and does not disclose the relationship between the features (i) to (vi) and the shrinkage ratio. Therefore, based on the disclosure of Toyoda, it would not have been obvious to arrive at the presently claimed invention. Moreover, Toyoda does not disclose or suggest the effects which can be achieved in the presently claimed invention.

In view of the foregoing, Applicants respectfully submit that claim 1 is patentable over Toyoda and thus the rejection should be withdrawn. Additionally, claims 2-4 depend from claim 1 and thus are patentable over the cited reference at least by virtue of their dependency.

## II. New Claim

Newly added claim 10 recites a method for producing the polyethylene wax of claim 1, which is not disclosed in Toyoda.

## III. Conclusion

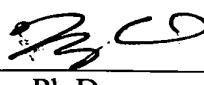
From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order and such action is earnestly solicited. If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at his earliest convenience.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: April 6, 2010

By:

  
Fang Liu, Ph.D.  
Registration No. 51283

Customer No. 21839  
703 836 6620